anty of cure in certain cases where it appears to be almost essential, if this most desired result is to be attained. For this reason I believe, independently of the questions of less expense and larger numbers provided for, the New York Board of Health has wisely determined to adopt the method of tent treatment of the consumptive poor in the incipient or primary stage of disease, whose cases it may be able later properly to care for.

No doubt, also, the amount of exercise judiciously proportioned in individual cases, which to many a camp life almost necessitates, is additionally a reason why tent life is an ideal life for these sufferers. Keeping the tent "shipshape," or keeping the camp cleanly, orderly, attractive, is surely useful and beneficial work for them. Their minds are agreeably occupied, and their bodies freshened and strengthened in performing the tasks, with this object in view, duly assigned to them.

Except in the febrile exacerbations of the disease, or in cases of extreme weakness, there are few instances in which tuberculous patients will not obtain distinct advantages from this mode of life over any other, provided, of course, the tent or camp life is followed in a desirable locality and with ambient surroundings in every way hygienic.

Latterly, Dr. A. Mansfield Holmes[1] called particular "attention to the essentials of an ideal tent cottage, and gave rules for governing tent life." . . . . "A model of the tent cottage adopted by the Rocky Mountain Industrial Sanatorium was exhibited" by him before the Mississippi Valley Medical Association, "showing improved methods of construction and ventilation."

AN EPIDEMIC OF TYPHOID FEVER DUE TO IMPURE ICE.

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The St. Lawrence State Hospital is situated on the St. Lawrence River, three miles below the city of Ogdensburg. At this point the river is a mile and a quarter wide, has an average depth of from twelve to twenty feet, and the current is three miles per hour. This was the source of the water for the hospital from its organization in December, 1890, until December, 1900, the intake pipe extending two hundred feet from the shore into swift water, and to a depth of sixteen feet, on a rocky bottom. The water supply was considered ideal by the founders of the institution, who pointed to the great volume of the river, the comparatively rapid current, and the rocky formation of the river bed, and argued that the danger of contamination from the Ogdensburg sewers was reduced to an infinitesimal quantity; yet, within two months from the occupation of the first building, typhoid fever made its appearance and was practically endemic for ten years, increasing steadily with the growth of the population from two cases the first year to forty in 1900. In September, 1895, at the request of the superintendent, the State Board of Health made an investigation of the prevalence of typhoid fever in the hospital, and the report by Dr. F. C. Curtis embodied the following conclusion: "I would report that it is my opinion that this water supply (the St. Lawrence River) is the source of the endemic. 1. Because the other common sources for the development and spread of typhoid fever may all be excluded. 2. Because the characteristics of the endemic are those of such a constantly acting cause. 3. Because in the vast majority of cases the epidemic or endemic prevalence of typhoid fever is due to a contaminated water supply. In the present case we have a navigated and sewage-bearing stream used as the source of supply." Previous to this investigation the water had been tested chemically and bacteriologically with negative results. All observers agreed in the correctness of this conclusion, and it is not likely that ice at that time contributed in any appreciable degree as a causative factor. There are several reasons for this belief, one of which will suffice here, and that is in the earlier years each ward had its own drinking fountain, where the water was cooled in an ice chamber in the basement, and ice was not put into water or milk.

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[1] New York Medical Journal, February 21, 1903, p. 346.

Boiled water was then provided for drinking and every effort made to prevent employés and patients using water from the faucets for that purpose. By this means the disease was kept in check to some extent; but employés would become careless after a time when there was no sickness to remind them of it, and many of the patients, from delusions of poisoning or for other reasons, refused the boiled water and drank from the faucets in the lavatories.

Various measures for purification were investigated, and it was finally decided to abandon the St. Lawrence River and obtain water from the Oswegatchie River, a small Adirondack stream, from which the city of Ogdensburg is supplied, by extending our mains to connect with those of the city. This was done in December, 1900, and with the exception of two cases which occurred about the time the change was made, and probably contracted previously, there were no cases of typhoid that were not clearly contracted elsewhere until October, 1902. During this period of twenty-one months water was not boiled and ice was freely used as an article of food by both patients and employés.

On October 2d three attendants in the same building were reported ill with fever, headache, and malaise; on the 3d, two others with like symptoms; on the 4th another case occurred; on the following day two others, making eight within four days. The symptoms presented by these early cases were principally of a nervous type; there was intense aching in the back and limbs, insomnia, headache, restlessness, and dry cough. The temperature of several of the patients reached 103° to 104° F. the first day.

The disease was considered epidemic influenza until toward the end of the first week, when the rash and other symptoms of typhoid made the diagnosis no longer doubtful. Of the eight persons first attacked, seven were employés who ate in the same dining-room, and the other was a woman patient who had been working there. The local conditions about this dining-room and kitchen were thoroughly inspected, with negative result; the milk is obtained from our own herd and could not have been infected. All the containers were sterilized twice daily, no water was used except from the faucets, and there had been no fever among the men working in the barns. The possibility of infection from vegetables and oysters was eliminated after investigation. Inquiry of the health department of the city showed that typhoid was not prevalent there among users of the Oswegatchie water. There remained only the ice to be considered, and one point of interest in this connection is that about six days before the first cases developed a new ice-house had been opened from which none had been previously withdrawn this year. The ice had been taken from the St. Lawrence River and had been stored since February, a period of more than seven months, and though gathered from the same spot as that in house No. 1, it was at a different time. Dr. John W. Benton, health officer of the city of Ogdensburg, informs us that during the months of January and February, 1902, when this ice was forming, there were three or four cases of typhoid fever in the city among users of well-water. None of them was verified by autopsy, but he thought there could be no question as to the nature of the disease. The temperature prevailing during the week the ice was being stored was, according to the records of the Weather Bureau observer at this point—maximum, 14° F.; minimum, —1° F. The ice was cut from the same spot during the past twelve years but one, and was never before suspected of conveying disease.

A specimen of drinking water and one of melted ice was sent at once to the Bender Laboratory in Albany, N. Y., for bacteriological examination. The ice selected was clear and free from extraneous matter. The report of the director, Dr. George Blumer, is in part as follows: " Specimen No. 1, drinking water (Oswegatchie). Number of bacteria per cubic centimetre on agar plates, 11,000; on gelatin plates, 3600. The fermentation test showed no gas in eight tubes, each treated with one cubic centimetre of water. Specimen No. 2, melted ice (St. Lawrence). Number of bacteria per cubic centimetre on agar plates, 30,400; on gelatin plates, 50,400. Out of eight fermentation tubes inoculated three showed definite evidence of organic contamination in the form of the colon bacillus." This report from so excellent an authority satisfied us that the contagion of typhoid was in all probability in the ice from ice-house No. 2, and we began an investigation in the laboratory of the St. Lawrence State Hospital to determine whether or not the bacillus typhosus could be isolated from it.

We examined the stock of ice, and found that some of the cakes contained foreign substance in the form of black or dark brown, granular matter, solidly frozen in the ice. These cakes were broken and the portions containing the foreign matter removed. The cakes were about sixteen inches in thickness, and the portions selected were, as near as possible, from the centre. We were careful to choose no snow ice. These fragments were melted in a clean vessel at room temperature, after which a considerable black sediment was deposited in the vessel. Examined under the microscope with low power it appeared as black, homogeneous masses; with the $\frac{1}{16}$ objective the field was crowded with organisms, many of which were motile. Cultures made from the sediment and the water, in bouillon, showed a rapid growth, with fecal odor in all the tubes. Series of plates were then prepared from these cultures by the usual method, and well-defined colonies were isolated in the end plates.

Five colonies were selected which presented characteristics resembling the typhoid bacillus, and fresh cultures were made from them. Of these cultures three proved to be the colon bacillus, one was a bacillus not identified, while the fifth was a pure culture of the typhoid bacillus, as shown by the following tests: On nutrient agar it grows readily; in broth no pellicle is formed; in lactose media no fermentation occurs; on potato the growth is invisible; in litmus milk the reaction is faintly alkaline and no coagulation occurs; with the serum of typhoid fever patients characteristic clumping is produced; it is an actively motile bacillus having the appearance of the bacillus typhosus. The disease was identified clinically by autopsies in three of the cases, in all of which the intestinal and abdominal lesions were demonstrated.

In "An Investigation of the Boston Ice Supply,"[1] in 1901, conducted by the board of health, the work of Sedgwick, Winslow, and Park is reviewed and the following statement made: "These considerations show that ice more than three weeks old is sanitarily as safe as a well-filtered water supply. Cases of typhoid fever, due to ice, might naturally be expected to occur, if at all, at the time immediately following the cutting of infected ice, and as this is done in

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[1] Boston Medical and Surgical Journal, vol. cxlv. p. 557.

January usually, after March at latest the ice could hardly be held responsible for any trouble, even were it known to be infected." It should be borne in mind, however, that the work of the authorities referred to and upon which this conclusion is based was done under artificial conditions, and in its natural environment the bacillus now appears to have a greater resistance, not heretofore recognized. In our review of the literature we have been unable to find any similar cases reported, and in the article quoted the statement is made that only a single authentic case is on record.

With the discontinuance of the use of the infected ice the epidemic gradually subsided. There were in all thirty-nine cases, the last of which developed in November. Our water is not boiled, and the conditions, with the exception of the ice, are the same as at the beginning of the epidemic.

THE TRANSMISSION OF BOVINE TUBERCULOSIS BY MILK, WITH A TABULATION OF EIGHTY-SIX CASES.

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The agency of milk in the causation of scrofula was referred to by Carmichael[1] in his *Essay on the Nature of Scrofula, with Evidence of its Origin from Disorders of the Digestive Organs*, London, 1810, in which he refers to *acescent* (sour) diet, especially of cow's milk, as a frequent cause. On page 50 he says: "Infants at the time of weaning are from the change of diet particularly subject to bowel complaints, too often followed by disease of the mesenteric and lymphatic glands."

He quotes Richard Wiseman (1626–1686), White (1787), and Lieutand to show that whenever the outward glands appear swollen, one may safely conclude the mesenteric to be so, too, they being usually the first part that is attacked by this malady. Indeed, Carmichael, while he never saw a subject in the dissecting-room with strumous glands externally without a similar state of those of the mesentery, claims that he has very frequently seen the latter unaccompanied by any affection of the external glands, which to his mind indicates that in scrofula the mesenteric glands are the first involved.

While Carmichaël did not attempt to prove the transmission of scrofula in the milk of diseased cows, he points with emphasis to the use of sour milk, and on page 101, remarks:

> "With respect to the disease in question, we know that swine are so subject to one very similar that scrofula has in consequence derived its name